

**IN THE CLAIMS:**

- 1 1. (ORIGINAL) A method for classifying a data packet in accordance with one or more  
2 rules wherein the data packet contains a packet header that is used to classify the packet,  
3 the method comprising the steps of:  
4       dividing the packet header into a plurality of sections;  
5       for each section, performing a lookup operation to acquire a set of rules and a set  
6 of actions associated the section, wherein the set of rules represents one or more rules as-  
7 sociated with the section and the set of actions contains an action for each rule repre-  
8 sented in the set of rules;  
9       for a particular section, determining if each action in the set of actions indicates  
10 the same action for all the rules represented in the set of rules associated with the section;  
11 and  
12       if so, classifying the data packet based on the action indicated in the set of actions  
13 for the particular section.
- 1 2. (ORIGINAL) A method as defined in claim 1 comprising the steps of:  
2       determining if the lookup operation performed is a final lookup operation; and  
3       if so, classifying the data packet according to the results of the lookup operation.
- 1 3. (ORIGINAL) A method as defined in claim 2 wherein the final lookup operation  
2 yields a results table index.
- 1 4. (ORIGINAL) A method as defined in claim 3 comprising the step of:  
2       using the results table index to identify an action that is used to classify the data  
3 packet.
- 1 5. (ORIGINAL) A method as defined in claim 1 comprising the step of:

2           for the particular section, if each action in the set of actions is not the same, per-  
3           forming a next-level lookup operation to identify a set of rules and a set of actions associ-  
4           ated with a next level of classification.

1       6. (ORIGINAL) A method as defined in claim 1 wherein the acquired set of rules is rep-  
2       resented as a rule bitmap and the identified set of actions is represented as an action bit-  
3       map.

1       7. (ORIGINAL) A method as defined in claim 6 comprising the steps of:  
2           for each section, using a value associated with the section to index a first-level  
3           lookup table to acquire an equivalence set index associated with the section; and  
4           using the equivalence set index to acquire a first-level rule bitmap and a first-level  
5           action bitmap associated with the section.

1       8. (ORIGINAL) A method as defined in claim 7 comprising the steps of:  
2           determining if the acquired action bitmap indicates the same action for all rules  
3           represented in the rule bitmap; and  
4           if so, classifying the packet based on the action indicated in the acquired action  
5           bitmap.

1       9. (ORIGINAL) A method as defined in claim 7 comprising the step of:  
2           determining if the acquired action bitmap indicates the same action for all rules  
3           represented in the rule bitmap; and  
4           if not, performing a next-level lookup operation.

1       10. (ORIGINAL) A method as defined in claim 1 comprising the steps of:  
2           applying values associated with the sections to first-level lookup tables to acquire  
3           equivalence set indices associated with the section;  
4           generating a next-level lookup table index using the equivalence set indices;

5           applying the next-level lookup table index to a next-level lookup table to acquire  
6 a next-level lookup table entry;  
7           determining if the next-level lookup table entry is empty; and  
8           if so, generating a next-level lookup table entry and a next-level equivalence set  
9 entry associated with the next-level lookup table index.

1   11. (ORIGINAL) An apparatus for classifying a data packet in accordance one or more  
2 rules, using a hierarchy of lookup tables, the hierarchy comprising a first level and one or  
3 more successive levels, the data packet containing a packet header that is used to classify  
4 the packet, the apparatus comprising:

5           a memory coupled to the processor and configured to hold the hierarchy of lookup  
6 tables; and

1           a processor adapted to (i) divide the packet header into a plurality of sections, (ii)  
2 perform a lookup operation for each section in a first-level lookup table associated with  
3 the first level to acquire a set of rules and a set of actions associated with the rules for the  
4 section, (iii) determine if the action specified for each rule in the set of rules is the same,  
5 (iv) and if so, classifying the packet according to the action.

6   12. (ORIGINAL) An apparatus as defined in claim 11 wherein the processor is config-  
7 ured to perform a next-level lookup operation if the action specified for each rule in the  
8 set of rules is not the same.

1   13. (ORIGINAL) An apparatus as defined in claim 11 wherein the processor is config-  
2 ured to determine if the lookup operation is a final lookup operation and if so, classify the  
3 data packet according to the results of the lookup operation.

1   14. (ORIGINAL) An apparatus as defined in claim 11 wherein the acquired set of rules is  
2 represented as a rule bitmap and the identified set of actions is represented as an action  
3 bitmap.

1 15. (ORIGINAL) An apparatus as defined in claim 14 wherein the processor is config-  
2 ured to, for each section, acquire an equivalence set index associated with the section and  
3 use the equivalence set index to index an equivalence set to acquire a rule bitmap and ac-  
4 tion bitmap associated with the section.

1 16. (ORIGINAL) An apparatus as defined in claim 15 wherein the processor is config-  
2 ured to determine if the acquired action bitmap indicates the same action for all rules rep-  
3 resented in the rule bitmap and if so, classify the packet based on the action indicated in  
4 the identified action bitmap.

1 17. (ORIGINAL) An apparatus as defined in claim 15 wherein the processor is config-  
2 ured to determine if the identified action bitmap indicates the same action for all rules  
3 represented in the rule bitmap and if not, perform a next-level lookup operation.

1 18. (ORIGINAL) An intermediate node comprising:  
2 means for dividing the packet header into a plurality of sections;  
3 means for performing a lookup operation to acquire a set of rules and a set of ac-  
4 tions associated with each section, wherein the set of rules represents one or more rules  
5 associated with a section and the set of actions contains an action for each rule repre-  
6 sented in the set of rules;  
7 means for determining, for each section, if each action in the set of actions indi-  
8 cates the same action for all the rules represented in the set of rules associated with the  
9 section; and  
10 means for classifying the data packet based on the action indicated in the set of  
11 actions for the particular section if the action is the same.

1 19. (ORIGINAL) An intermediate node as defined in claim 18 comprising:

2 means for determining if the lookup operation performed is a final lookup opera-  
3 tion; and

4 means for classifying the data packet according to the results of the lookup opera-  
5 tion if the lookup operation performed is the final lookup operation.

1 20. (ORIGINAL) A computer readable medium comprising computer executable instruc-  
2 tions for:

3 dividing a packet header, contained in a data packet that is used to classify the  
4 data packet, into a plurality of sections;

5 for each section, performing a lookup operation to acquire a set of rules and a set  
6 of actions associated the section, wherein the set of rules represents one or more rules as-  
7 sociated with the section and the set of actions contains an action for each rule repre-  
8 sented in the set of rules;

9 for a particular section, determining if each action in the set of actions indicates  
10 the same action for all the rules represented in the set of rules associated with the section;  
11 and

12 if so, classifying the data packet based on the action indicated in the set of actions  
13 for the particular section.

1 21. (CANCELLED)